



Driver Distraction: New Features, New Tasks, New Risks

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New Features

- Advances in technology have created the opportunity to place new features in vehicles
 - Primarily convenience
 - Could potentially improve productivity
 - Could possibly have safety benefits
 - Traffic, Weather, Obstacle Information
 - Emergency Communications
 - Exposure Reduction

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New Features (continued)

- Traffic, Weather, Obstacle Information
 - Probably beneficial, but data are lacking to support accurate prediction of degree of benefit
- Emergency Communications
 - 911/311 is valuable, but does not preclude eliminating or locking-out convenience features
- Exposure Reduction
 - Less travel time is possible; but cost, availability, and ease of use will increase exposure

New Tasks

- Some tasks that are/will be performed in moving vehicles are different than any traditional in-vehicle task.
- Some require substantial visual and/or higher order cognitive information processing that interferes with driving and can compromise safety.

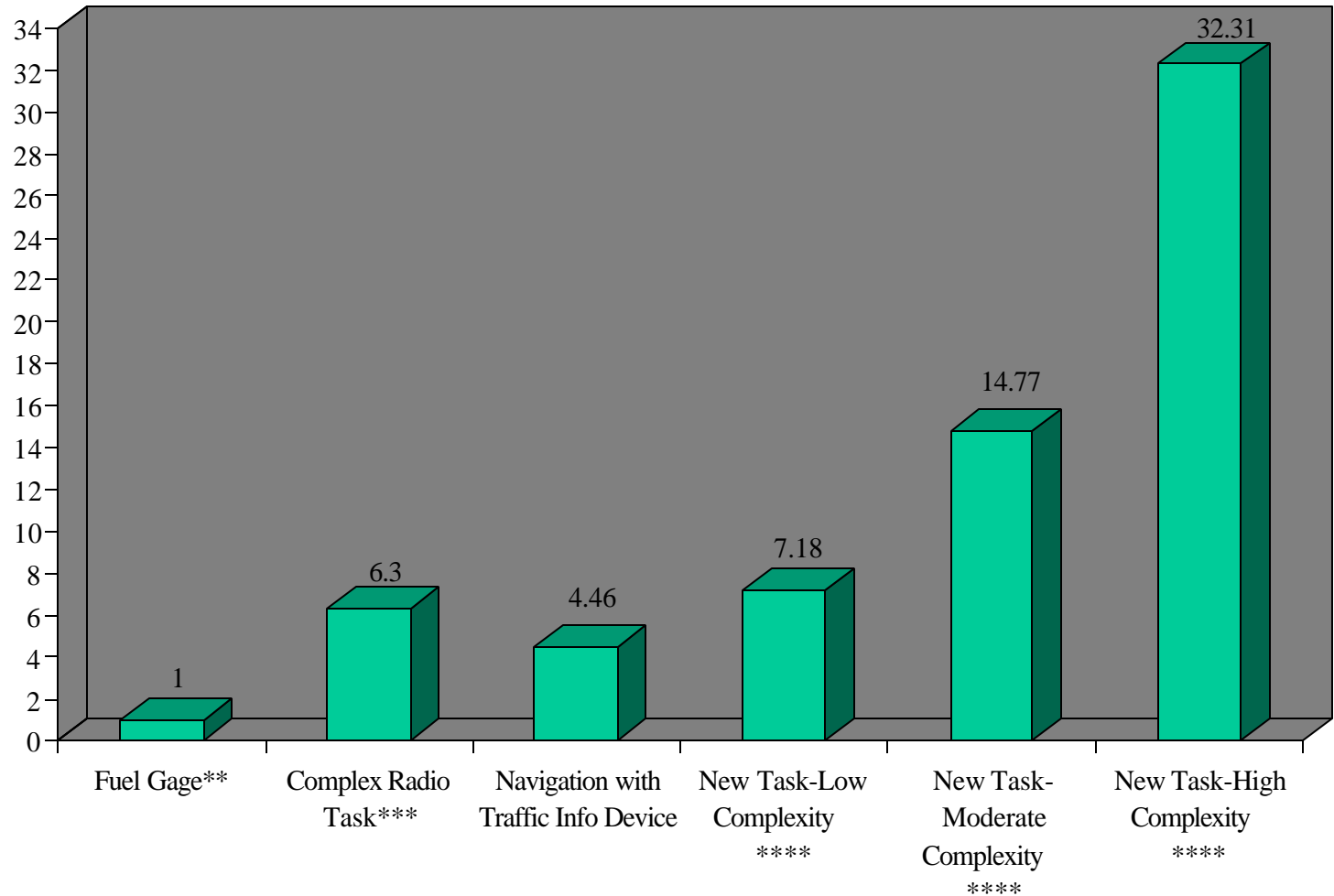
New Tasks (continued)

- Functions accessible in a moving vehicle must be carefully considered in terms of:
 - Necessity/Benefits to the driver
 - Without direct safety benefit, less is always safer
 - Safety Impact in General
 - Complexity, both visually and cognitively
 - Design in Particular
 - To minimize attention demand
 - To actively provide safety benefit

New Risks: What the Literature Tells Us

- Strong evidence that diverting visual attention away from the roadway results in an increased risk of crashes.
- Growing evidence of greater crash risk with increasing cognitive demand; even from voice-based systems.
- We need more and better data to fully understand such problems

Estimated Relative Crash Rate*



* Using Wierwille and Trjerina's (1996) Model

** Adjusting so that the crash rate of reading a simple gage is set equal to 1.0

*** Such as as inserting a CD or manual tuning

**** Typical values seen across many tests. Does not represent a particular device or task.

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	Average Glance Time (seconds)	Average Number of Glances	Estimated Frequency of Use/Week
Check Fuel Gage	1.3	1.2	25
Complex Radio Task	1.1	4.0	56
Navigation with Traffic Info	1.5	5.8	20*
*New In-vehicle Task of Low Complexity	1.4	10.0	20***
*New In-vehicle Task of Moderate Complexity	1.6	18.0	20***
*New In-vehicle Task High Complexity	1.8	35	20***

* Typical values seen in a variety of testing. Does not represent a particular device or task.

** Does not include reduction in exposure from potential trip length reduction or change in road class.

*** Assumes two tasks per commute trip, 10 commute trips per week.

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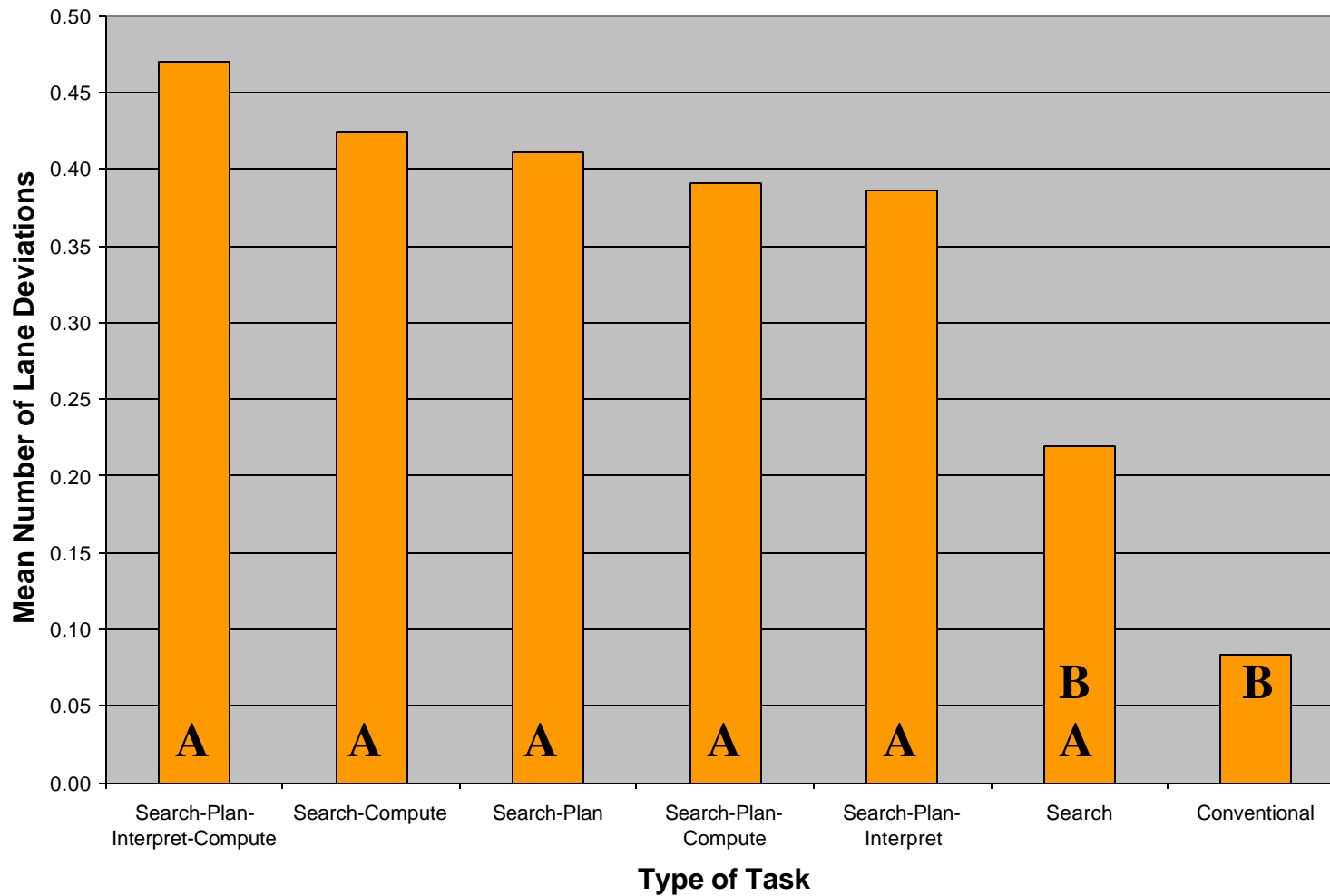
Speech Based Vs. Visual/Manual

Always assumed that Voice/Auditory is:

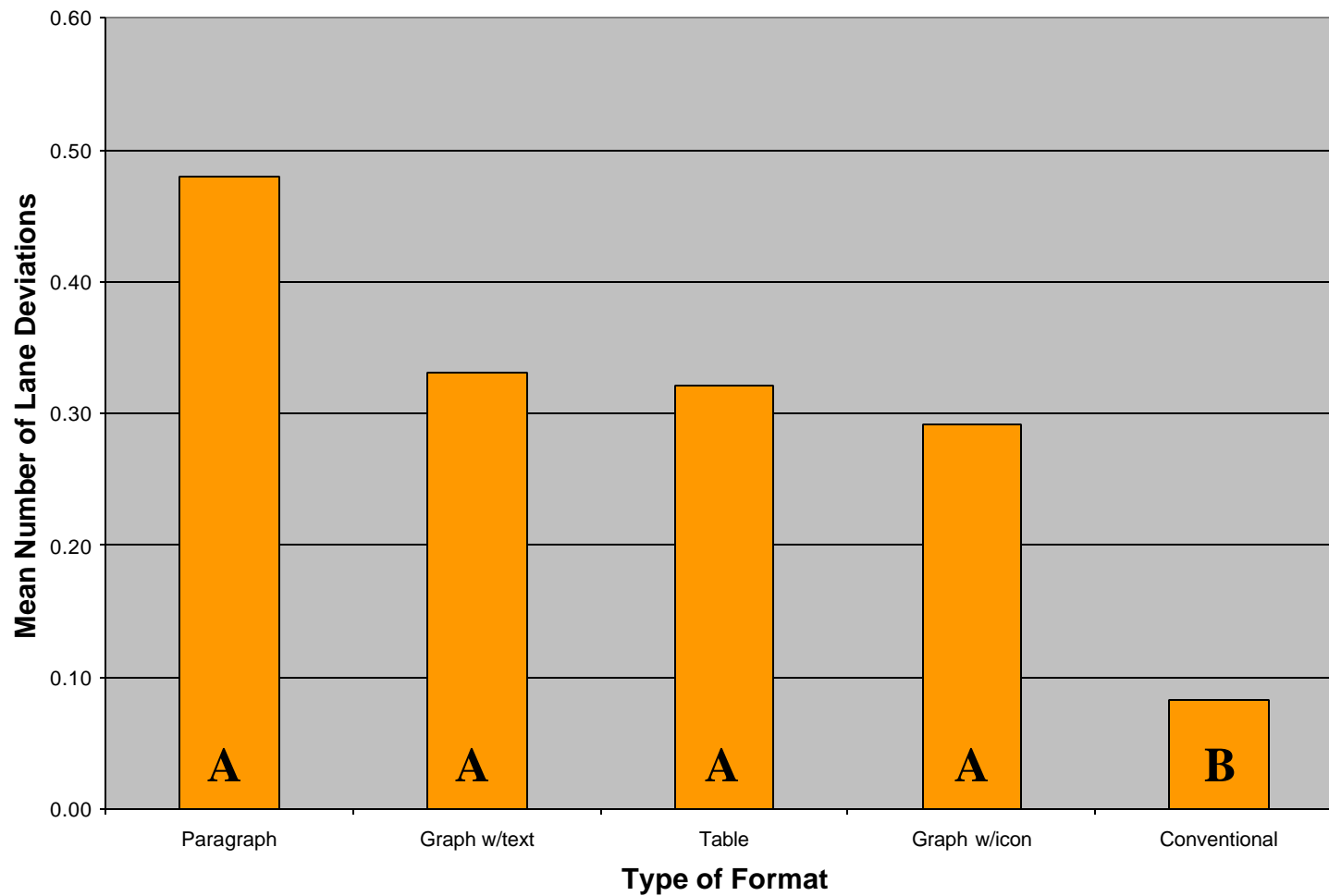
- Substantially better
- Has a limited impact on driving performance

Recent results show that there is an impact and “better” may not be true in every case:

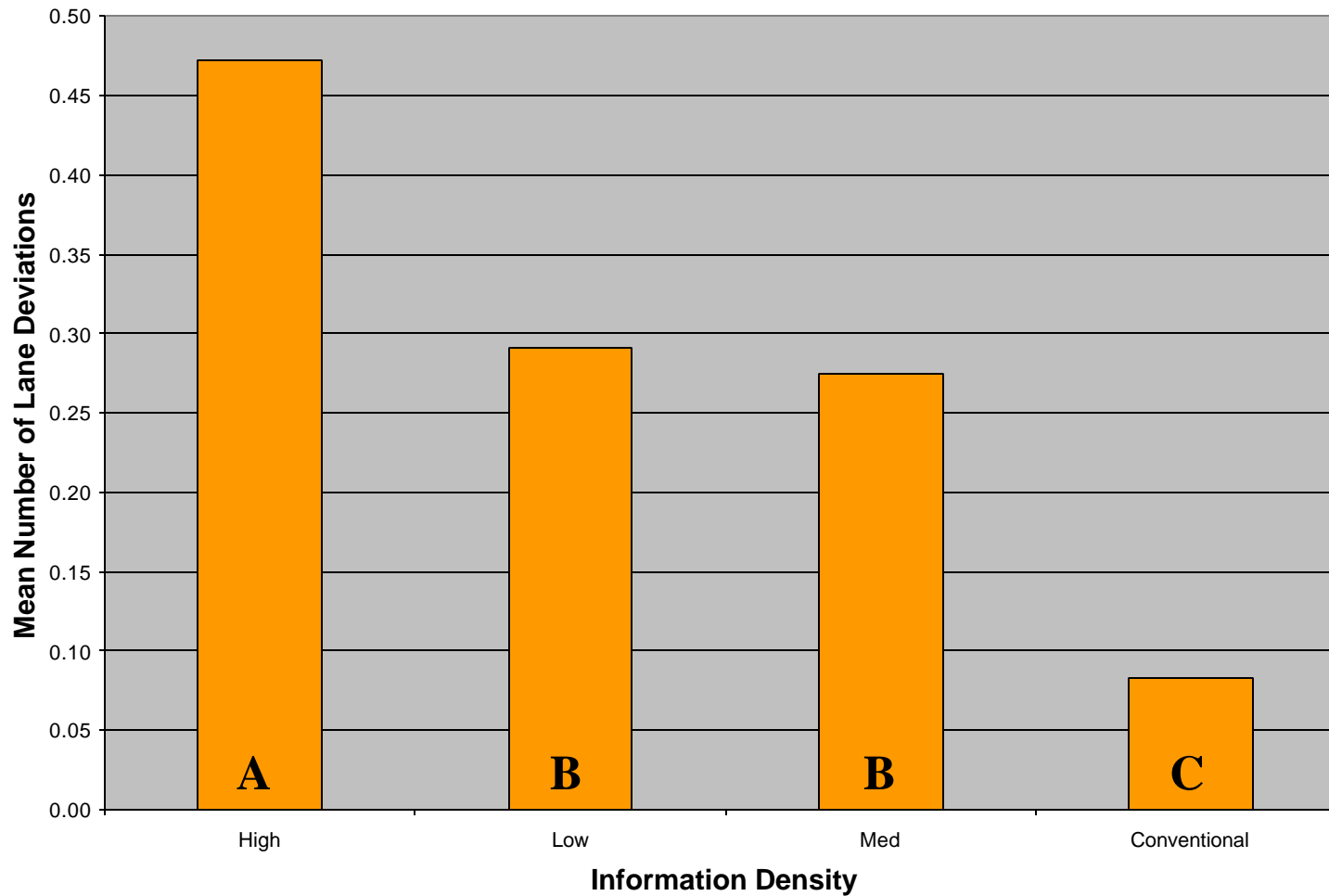
- Increase in reaction time
- Decreased situation awareness (tunneling of attention)
- Can increase task completion time over visual/manual
- Increased crash risk
- Increased missed responses in a signal/ response task



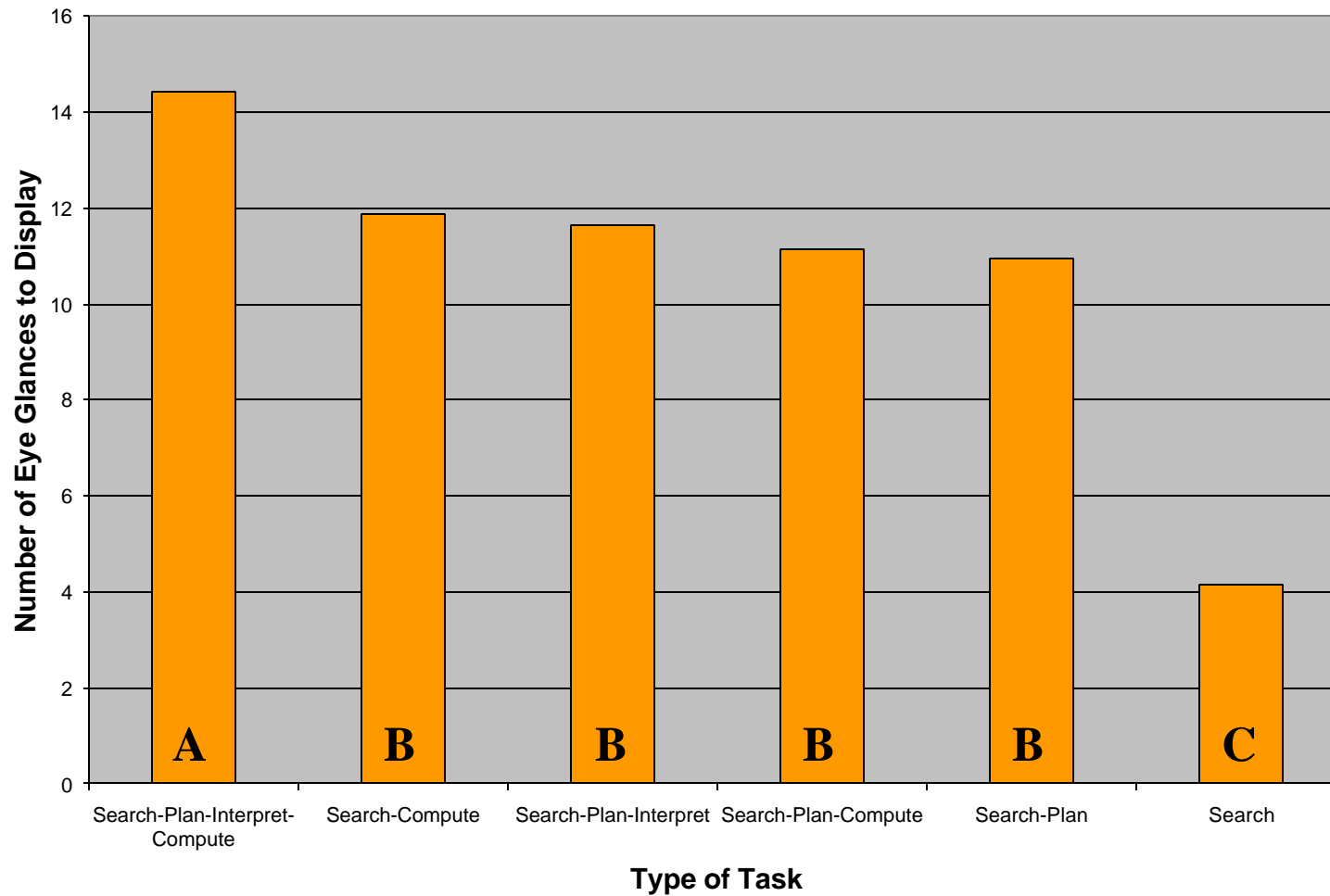
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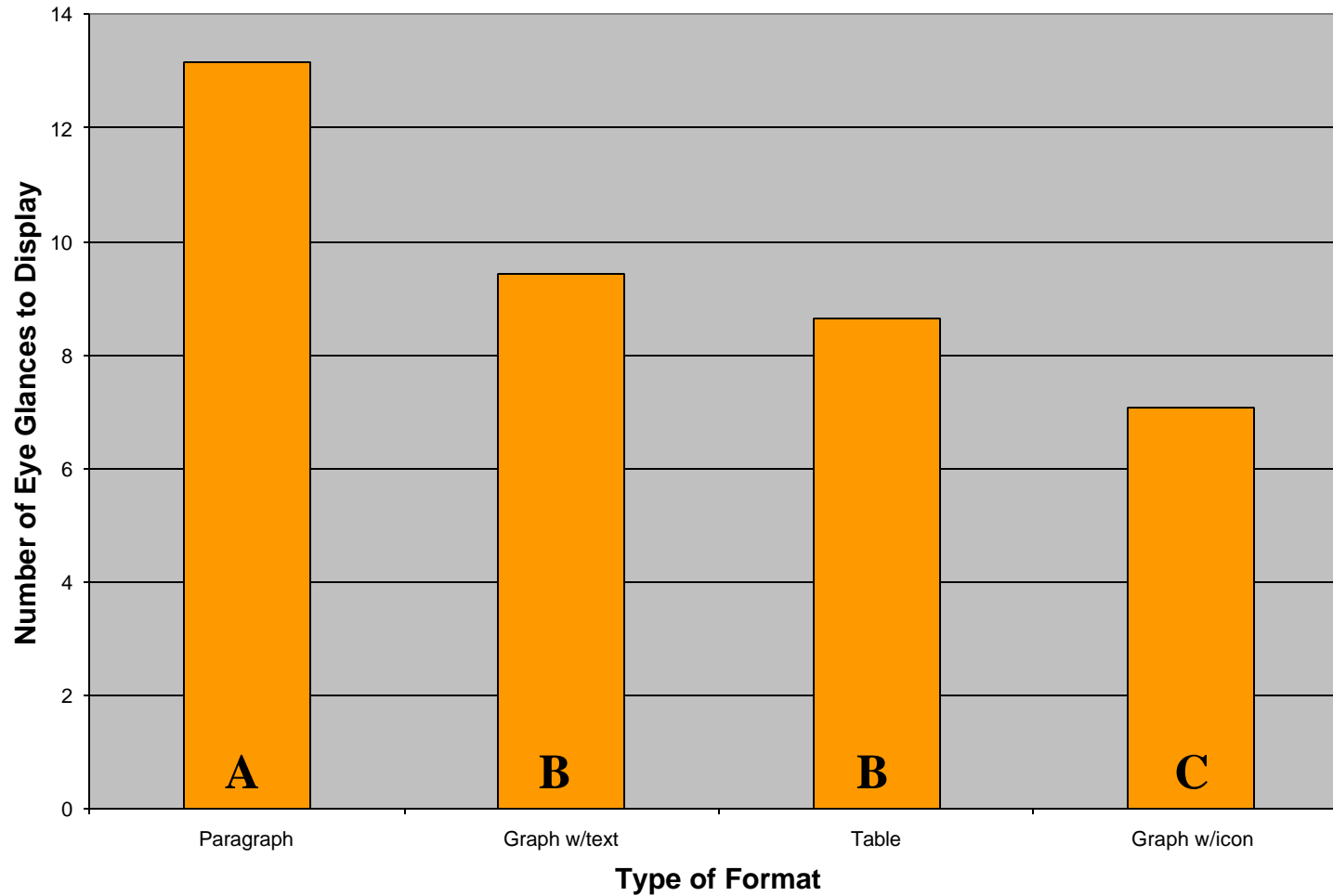
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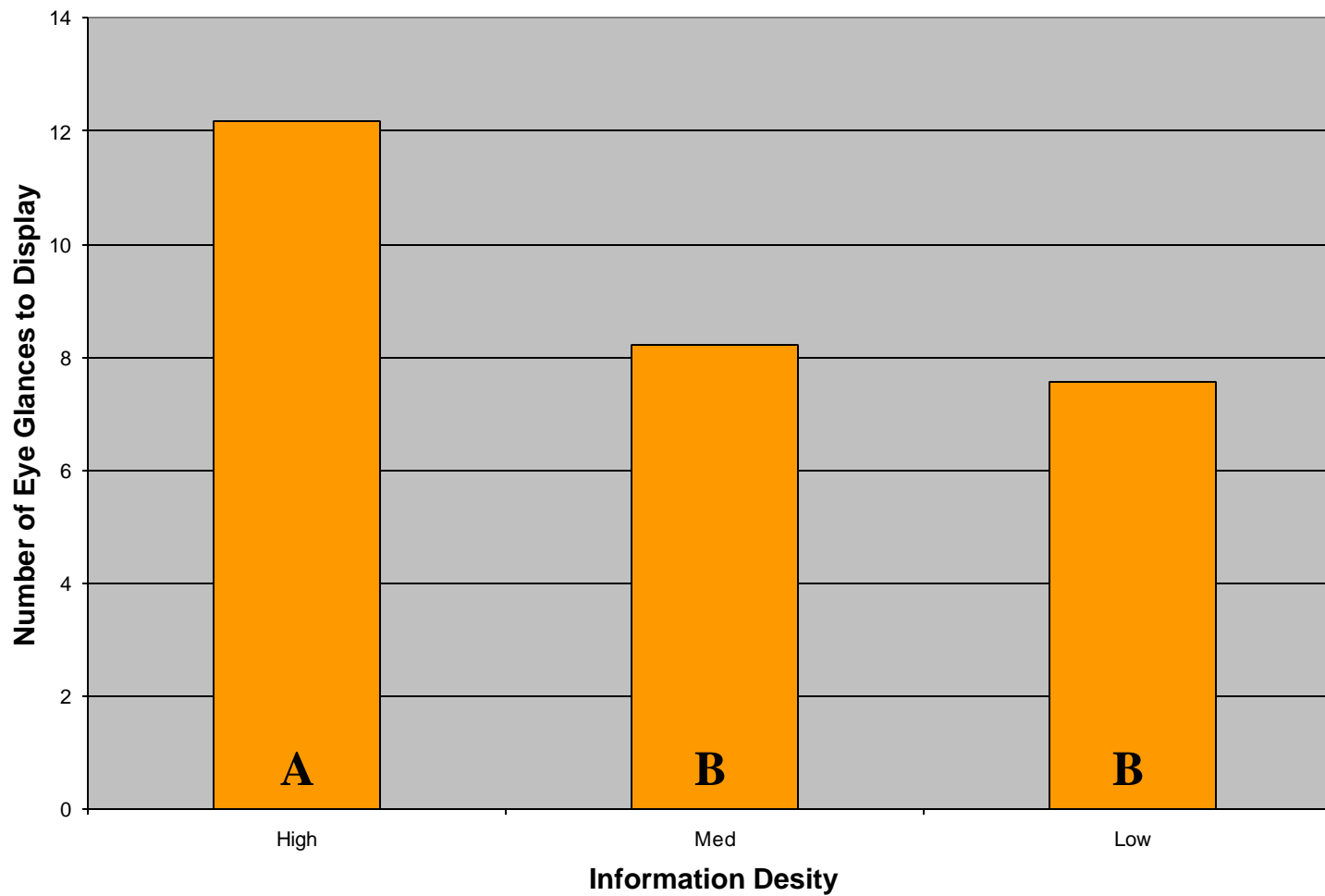
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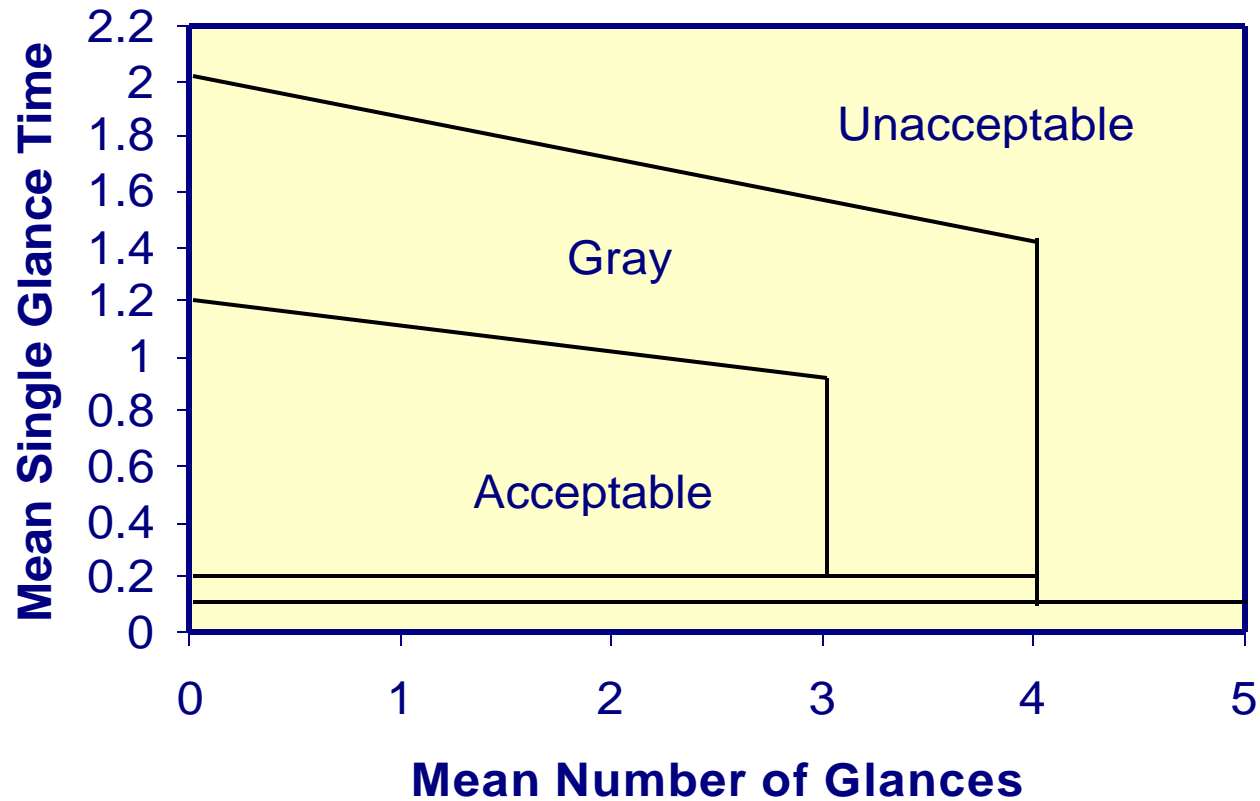
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Conclusions

- Increasing features in cars may be feasible with very prudent allocation, design, and attention to maximizing safety benefits
- However, crashes will increase significantly if improperly designed systems are deployed in large numbers
- Additional simulator and on-road data are needed to better support safety decisions regarding future in-vehicle systems